

Lewis River Hydroelectric Projects Relicensing

Merwin Hydroelectric Project (FERC No. 935)
Yale Hydroelectric Project (FERC No. 2071)
Swift No. 1 Hydroelectric Project (FERC No. 2111)
Swift No. 2 Hydroelectric Project (FERC No. 2213)

**USDA Forest Service
Gifford Pinchot National Forest**

EXISTING INFORMATION ANALYSIS

6. Fish Passage and Reintroduction of Anadromous Fish Species

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I. Existing Situation

Historically, anadromous fish species were able to migrate freely throughout the Lewis River Basin. Wild runs of salmon, steelhead, cutthroat trout, and possibly Pacific lamprey ascended the Lewis River from its confluence with the Columbia River and migrated into the upper basin waters on National Forest System lands. Anadromous fish spawned in these rivers and streams, leaving behind carcasses that provided essential nutrients to the stream-riparian-terrestrial ecosystem (Cederholm et al. 1989 and Bilby et al. 1996), which supported their progeny and the continuance of complex life cycles. Additionally, those fishes exhibiting resident or fluvial life history forms were unobstructed from migrating throughout the river system as well.

With the completion of Merwin Dam in 1932 (known as Aerial Dam at that time), migration of anadromous fish into the Lewis River system upstream of river mile (RM) 20 was terminated (PacifiCorp and Cowlitz PUD 1999a). This eliminated roughly 150 miles of rivers and streams available to salmon and steelhead. This estimate is based on the preliminary results from the current Anadromous Habitat Inventory study underway (PacifiCorp and Cowlitz PUD 1999b) to define the upper limits of anadromy above Merwin Dam and an estimate of the miles of river and tributaries inundated by Merwin, Yale, and Swift dams, including the dewatered Swift Bypass Reach. At present, there are approximately 96.1 miles of available river and stream habitat in the Lewis River Basin upstream of Merwin Dam (George Gilmour, Harza, personal communication and 2001 Technical Report). The majority of this habitat occurs on National Forest System lands.

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A fish trapping facility was part of the original design (at Merwin Dam) since conventional fish passage was “out of the question.” That is, the perception was that a conventional facility could not be designed to accommodate the height of Merwin Dam (PacifiCorp and Cowlitz PUD 1999a). The construction of three other hydroelectric projects in the basin; Yale Dam in 1953, Swift No. 1 and Swift No. 2 both in 1958; provided additional migration blockages to remaining resident and fluvial fish species in the upper basin. None of these hydroelectric projects were equipped with fish passage facilities.

Anadromous fish species affected by the blockage of migration at all four hydroelectric projects in the Lewis River Basin include steelhead, coho salmon, chinook salmon, chum salmon, coastal cutthroat trout, and Pacific lamprey. The historic distribution of eulachon (smelt) in the Lewis River system remains largely unknown and is only speculative. Steelhead present in the Lewis River are contained within the Lower Columbia River Evolutionarily Significant Unit (LCR-ESU) and are listed as “threatened” under the Endangered Species Act (ESA). Additionally, chinook and chum salmon are listed as “threatened” under the ESA. Both coho salmon and cutthroat trout are proposed for ESA listing. The status of both Pacific lamprey and Eulachon are considered to be declining, however, available data are lacking.

Non-anadromous salmonids in the Lewis River system affected by migration blockages include native bull trout, rainbow trout, and coastal cutthroat trout. Bull trout are also listed as “threatened” under the ESA. Two sub-populations of bull trout occur in the Lewis River Basin: the Yale Reservoir Sub-Population and the Swift Reservoir Sub-Population (USDI 1998a and 1998b). Both sub-populations exhibit an adfluvial life history type. Known spawning tributaries for these two sub-populations include Cougar Creek (Yale Reservoir Sub-population) and Pine and Rush creeks (Swift Reservoir Sub-population).

The estimated Cougar Creek spawning population ranges from zero to 40 individuals (PacifiCorp and Cowlitz PUD 1999a). Annual estimates of the Swift Reservoir Sub-Population have ranged from 101 to 437 individuals from 1994 through 1998 (GPNF 1999). Very little is known about the population structures or trends for native rainbow and cutthroat trout in the Lewis River system upstream of Merwin Dam. Furthermore, very little is known about their migratory behavior.

II. Management Direction

Code of Federal Regulations (CFR)

36 CFR 219 covers the planning process for development of National Forest Land and Resource Management Plans. Direction set forth in the CFR's applies to all NFS lands. The Code of Federal Regulations provides the implementing direction for the National Forest Management Act. Forest Plans, including their amendments, embody this direction.

Under CFR 219.19, paragraph 1 states, "Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one that has the estimated numbers, and distribution of reproductive individuals to ensure its continued existence is well distributed in the planning area. In order to ensure that viable populations will be maintained, habitat must be provided to support, at least a minimum number of reproductive individuals and that habitat must be well disturbed so that those individuals can interact with others in the planning area.

-219.19 (2) Planning alternatives shall be stated and evaluated in terms of both amount and quality of habitat and of animal population trends of the management indicator species. We interpret this to include Threatened and Endangered species as well as EDT diagnostic species, such as spring/fall Chinook salmon, coho salmon, chum salmon, summer/winter steelhead trout and bull trout.

-219.19 (3) Biologists from State fish and wildlife agencies and other Federal agencies shall be consulted in order to coordinate planning for fish and wildlife, *including opportunities for the reintroduction of extirpated species* (emphasis added).

Section 219.27(a)(6) Management requirements states: "Provide for adequate fish and wildlife habitat to maintain viable populations of native vertebrate species and provide that habitat for species chosen under 219.19 is maintained and improved to the degree consistent with multiple-use objectives established in the plan."

Section 219.27(g) Diversity states in part: "Management prescriptions, where appropriate and to the extent practicable, shall preserve and enhance the diversity of plant and animal communities, including endemic and desirable naturalized plant and animal species."

Forest Plan Direction

The Gifford Pinchot National Forest Land and Resource Management Plan (1990), as amended by the Northwest Forest Plan (NFP) in 1994, provides the management direction for all National Forest System lands and their associated resources directly affected by or within the project vicinity of the four hydroelectric projects in the Lewis River system. This plan was developed and enacted consistent with the requirements of the Forest and Rangeland Renewable Planning Act, as amended by the National Forest Management Act. The Aquatic Conservation Strategy (ACS), a core component of the Northwest Forest Plan, provides management direction aimed at maintaining or restoring the ecological health and functioning of watersheds and the aquatic ecosystems contained within them. Nine key ACS objectives were stated to guide development of new projects and evaluation of existing projects. ACS objectives that most apply to the fish passage issue include:

Objective 1 – Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations, and communities are uniquely adapted.

Objective 2 – Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

Objective 9 – Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

NFP Standard and Guide LH-1. Identify in-stream flows needed to maintain riparian resources, channel conditions, and fish passage.

NFP Standard and Guide LH-2. Tier 1 Key Watersheds (those watersheds that directly contribute to anadromous salmonid and bull trout conservation): For hydroelectric and other surface water development proposals, require in-stream flows and habitat conditions that maintain or restore riparian resources, favorable channel conditions, and fish passage. During relicensing of hydroelectric projects, provide written and timely license conditions to the FERC that require flows and habitat conditions that maintain or restore riparian resources and channel integrity.

Forest Service Manual

Forest Service Manual (FSM) 2670.12 directs the Forest Service to:

- *Manage habitats for all existing native and desired nonnative plants, fish, and wildlife species in order to maintain at least viable populations of such species,*
- *Conduct activities and programs to assist in the identification and recovery of threatened and endangered plant and animal species, and*
- *Avoid actions that may cause a species to become threatened or endangered.*

Forest Service Manual (FSM) 2670.22 directs the Forest Service to:

- *Maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands. A viable population is further defined by FSM 2670.5 as one that has the estimated numbers and distribution of reproductive individuals to ensure the continued existence of the species*

throughout its existing range (or range required to meet recovery for listed species) within the planning area.

III. Information Analysis

The four hydroelectric projects in the Lewis River Basin directly affect fish passage for all anadromous, fluvial, and adfluvial fish species upstream of Merwin Dam. The termination of anadromous fish runs to the upper basin on National Forest System lands is directly attributable to each of the four projects beginning with Merwin Dam as the furthest most downstream project. The projects' share of this impact and other related impacts associated with the loss of anadromous fish runs is assessed at 100 percent. In other words, the four hydroelectric projects are solely responsible for the loss of anadromous fish runs on National Forest System lands upstream of Merwin Dam.

Other related impacts or issues associated with the loss of anadromous fish runs include:

1. **A decrease in ecosystem productivity.** The role of salmon and steelhead in providing essential nutrients to the stream-riparian-terrestrial ecosystem complex, both during and after spawning, is becoming better understood through recent studies. These nutrients are cycled through the food web at multiple trophic levels. Returning salmon and steelhead also provide an important source of nutrients for several species of mammals and birds (Cederholm et al. 1989, Bilby et al. 1996, Gresh et al. 2000)
2. **A loss of recreational fishing opportunity for salmon, steelhead, sea run coastal cutthroat, and bull trout.**
3. **A loss in recreational or educational opportunities for Forest visitors.** There are no opportunities on National Forest System lands for Forest visitors to undertake such activities as fish viewing. Furthermore, there is a loss for interpretive, public outreach and education regarding salmon, their status, ecology, cultural significance, etc. on National Forest System lands.
4. **A decreased production potential for native anadromous fish in the basin.** Existing stream habitat that was part of a species historic range would go unutilized. The ability and existing production capability to compensate for this loss of natural fish production in other parts of the basin is lacking.
5. **A diminished chance for species recovery.** The likelihood for successful recovery of threatened anadromous fish species is reduced by a continuation of fish migration blockage at Merwin Dam and the other three hydroelectric projects to 96.1 miles of currently unused anadromous fish habitat, and to the continued loss of 50 miles due to inundation by the project.
6. **A greater reliance on hatcheries for total fish production in the basin.** With the loss of natural production in the Lewis River Basin, the reliance on hatchery salmon and steelhead has become a mitigative dependency for those losses. One exception, however, has been wild fall chinook, that successfully spawn in the Lewis River below Merwin Dam.

IV. Preliminary Forest Service Objectives

- 1) Ensure effective upstream and downstream passage of fish through the construction, operation, and maintenance of facilities or modifications to project operations to meet fishery management direction established in Forest Plans and other Forest Service administrative documents. Volitional fish passage is the goal at all four hydroelectric projects where it is technologically and biologically feasible.
 - a. Habitat to be accessed should be within the historic range of the species' being considered for passage. Non-native species will be considered for passage only if there are no negative impacts to native species.
 - b. Habitat to be accessed should be of sufficient quantity and quality to result in a projected net increase in individuals within the meta-population during the term of the license.
 - c. When they are available, stocks of fish used to initiate passage programs should be of native origin. Wild fish are preferred. Hatchery stocks with local origins would be acceptable if wild stocks are too low for use. Out-of-basin stocks should not be used unless other highly justifiable considerations override concerns about potential effects to the native gene pool.
 - d. Passage should not provide for the transmission of exotic pathogens or parasites that would result in significant adverse impacts to the endemic fish community. Potential for pathogen transmission should only stop passage efforts when the effects cannot be mitigated and adverse impacts are anticipated to exceed the benefits of providing passage.

It should be recognized that fish passage is a long-term commitment by both the utility and the agencies/parties involved in the decision. Development of a monitoring plan to assess the progress of efforts is necessary for success. The decision to provide for fish passage may in some cases more appropriately be delayed to a reasonable later date within the new license term through the use of an “if/then” clause included as a license condition.

- 2) Establish minimum in-stream flows required in the Swift Bypass Reach to allow for year-around downstream fish passage at Swift No. 1, if biologically and technologically feasible.
- 3) Ensure maximum survival and minimum impact on species life history characteristics by using specific fish passage criteria (e.g., fish guidance efficiency, bypass efficiency, etc.) as determined by the National Marine Fisheries Service, U.S. Fish

and Wildlife Service, and Washington Department of Fish and Wildlife at various facilities.

- 4) Implement an Anadromous Fish Reintroduction Plan, as part of the basin-wide Fish Planning Document (AQU-18), that:
 - a) Establishes clear goals and objectives for each species and stock.
 - b) Is developed in a cooperative manner amongst all interested parties.
 - c) Emphasizes natural production and the re-building of anadromous fishes endemic to the basin.
 - d) Sets forth monitoring actions to ensure an adaptive management feed-back loop to adjust reintroduction actions on an as needed basis to meet stated goals and objectives.
 - e) Provides frequent milestones for evaluating the success of the reintroduction effort.
 - f) Monitors the interactions between anadromous fish species and bull trout to ensure compatible recoveries for the various threatened species.
 - g) Provides critical evaluation and necessary safeguards for introduction of fish diseases into the basin upstream of Merwin Dam.
 - h) Implements concurrent projects (i.e., watershed and habitat improvements, nutrient enrichments, etc.) that will raise the productive capacity and potential of the aquatic ecosystem.
- 5) Develop acclimation ponds, if necessary, and fund their operation and maintenance in the upper basin on National Forest System lands to initiate re-building of native, endemic fish runs.

V. Information Needs

A few study proposals pertinent to fish passage and reintroduction of anadromous fish have been developed by the licensees and presented to participants for their review, input, and collaboration. These include the following:

- AQU 1 Report on Life History, Habitat Requirements, and Distribution of Aquatic Analysis Species
- AQU 2 Swift Bypass Reach Instream Flow Study
- AQU 4 Anadromous Fish Habitat Inventory
- AQU 5 Engineering Feasibility Study for Fish Passage Facilities
- AQU 8 Report on Fish Management and Hatchery Operations

The Forest Service has provided numerous comments to the licensees regarding these studies. The Forest Service identified other pertinent studies necessary for addressing fish passage and anadromous fish reintroduction. Further studies are needed that:

- 1) **Assess the habitat quantity and quality available for anadromous fish species upstream of Merwin Dam.** The current study in progress, AQU 4 Anadromous Fish Habitat Inventory, is a good study to identify the upper limits of anadromy.

However, it does not sufficiently identify habitat availability in a statistically reliable manner, nor does it partition habitat suitability by species. Studies on habitat quality are necessary to determine the production capability and opportunity for habitat improvements. See EIA on Aquatic Habitat Condition and Productivity for a more detailed description of these study plans.

Current situation relative to this proposal – based upon information presented in the Technical Reports (2000 and 2001) the level of aquatic habitat evaluation was minimal and it reflected a limited understanding of the available aquatic habitat accessible to an assemblage of reintroduced fish species. In 2002, the USDA Forest Service summarized all tributary aquatic habitat survey data into a report for submission to the Aquatics Resource Group (USDA Forest Service 2002).

- 2) **Examine the inter-specific competition between various fish species.** In particular, the possible conflicts between bull trout and anadromous species needs to be studied. An issue that has been raised repeatedly in the Aquatic Resource Group technical meetings is the possibility for the super-imposition of redds by salmon on bull trout. Additional concerns have been raised regarding competition for available rearing habitat. The effects of anadromous fish reintroduction require study. Furthermore, the potential production of sockeye salmon in the river system is unknown. The interaction between sockeye salmon and other species native to the system also requires evaluation.

Current situation relative to this proposal – This study was started late 2001 and is still in progress. At this time, the Aquatics Resource Group is awaiting the completion of this study.

- 3) **Determine the level of smolt predation and survival through the project reservoirs.** One of the most critical issues relating to anadromous fish reintroduction at an August 3, 1999 Aquatic Resource Group technical meeting was the survival of smolts traveling downstream through the project facilities. Studies are needed that will address the level of smolt predation by piscivorous fish, particularly introduced fish species, in the project reservoirs and downstream of project facilities. Studies are also needed to address the biological feasibility (i.e., migration time, sufficient flow through the reservoirs) for downstream passage of smolts with and without changes in reservoir pool operations. Reservoir pool operations and discharge amounts should be evaluated for each project to determine optimal conditions for passing smolt through the reservoirs and project facilities to ensure the highest survival and passage efficiencies.

Current situation relative to this proposal – Although several Aquatic studies may have provided some information relative to this question, the USFS is unsure whether this question was adequately answered in terms of predation and survival through the projects. Out-migration trapping efforts at Eagle Cliff and below Swift #1 were severely impacted due to woody material breaking a bridge and the

breach of Swift Power Canal. A majority of the migration window was missed in 2002. It was assumed that trapping efforts at Swift would be an adequate surrogate for Yale and Merwin reservoirs. It is possible that Swift and Yale may be similar in terms of relative risks to out-migrating smolts, however, Merwin reservoir's tiger muskellunge population may pose a significant predation challenge.

- 4) **Investigate the risk and potential for disease transmission and possible ramifications.** Critical fish diseases of concern in the Lewis River Basin need to be described. The risk for disease transmission from hatchery fish to native fish should be assessed. The risk of disease transmission from introduced anadromous fish to other salmonid species also requires evaluation.
- 5) **Provide necessary information to design and operate functional fish passage facilities.** In addition to investigating smolt passage through the various reservoirs and facilities, other fish passage studies will be necessary that address:
 - False attraction flows for upstream migrating adult fish.
 - Delays in fish migration due to project operations (eg. flow releases) or physical characteristics of designed facilities.
 - Various alternatives for developing the most efficient means and facilities to ensure the highest possible downstream fish passage for all fish species (eg. juvenile and smolt salmon and steelhead; juvenile, sub-adult, and adult bull trout and cutthroat trout).

Current situation relative to this proposal – see AQU-5 for information relative to passage scenarios. The USFS understands this subject is still open to discussion and further development.

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